STATE OF MAINE
PUBLIC UTILITIES COMMISSION

Docket No. 2002-665

April 18, 2003

LAURIE DOWNS, ET AL
Request for Commission Investigation Into
the New Central Maine Power Company
Transmission Line Proposal for Eliot, Kittery
And York

STAFF REPORT

I. SUMMARY

The purpose of this report is to present the Commission Staff's analysis of Central Maine Power Company's (CMP) proposed transmission line and related system upgrades in southern York County. (Primarily, in the towns of Kittery and York.) In analyzing CMP's proposal, we have used the same standards that would apply in a Certificate of Public Convenience and Necessity case. These are:

- is there a need for this (or a similar) project?
- does the proposed project best meet the need compared to alternatives?
- are local, environmental and land use implications reasonably mitigated?
- are the costs reasonable?

We have evaluated the "need" standard in terms of transmission and distribution (T&D) system capacity, given current and likely future loads in the area, and in terms of system reliability. In addition, we considered the operational, safety, cost and local implications of the proposed project and the options.

It is our view that a need exists for increased T&D system capacity to meet current and future loads in the area, more specifically, in the towns of York, Kittery, and

Ogunquit. In addition, it is our view that replacing the current radial system that now serves the area with a looped system would be beneficial in terms of reliability of service, and is appropriate given the magnitude of the load, the density and geographical character of the area, local T&D system maintenance requirements, and the potential loss of load from a single contingency outage. Thus, CMP's proposed project, or a set of similar T&D system additions and upgrades, is necessary and would be beneficial to the towns in terms of bringing them up to the same standard of reliability that exists in comparable areas throughout CMP's service area. Finally, it is our view that CMP's proposed transmission line and system upgrades are not intended to increase power flows between Maine and southern New England, nor, as a practical matter, could they be used for that purpose.

In the remaining sections of this report, we summarize relevant background material and describe the technical factors that drive the need for T&D system upgrades, both as a general matter and in this case. We review CMP's load in the area at issue; CMP's analyses of current equipment loadings and operational conditions, e.g. the load flow analyses; and the extent to which further short-term fixes, demand side measures and locally cited generation can defer or obviate the need for a new transmission line. Finally, we analyze CMP's proposed project and alternatives using the standards listed above.

II. BACKGROUND

A. Procedural History

On January 24, 2003 the Commission initiated this investigation in response to a complaint pursuant to 35-A M.R.S.A. § 1302 from Laurie A. Downs and nine other CMP customers and residents of the Town of York, and a Petition to Initiate Proceedings by the Office of the Public Advocate (OPA). The York Complainants sought the investigation to compel CMP to answer their questions and concerns about the proposed project, to produce objective information to show that the current system is inadequate and to consider alternatives to building a new transmission line. The OPA sought Commission involvement to "review, investigate and take appropriate action" with respect to CMP's planned transmission line construction.

In addition to its response to the 10-person and OPA complaints, CMP has filed numerous responses to Advisory Staff and Intervenor data requests. CMP has also answered questions at various case conferences. The Advisory Staff has relied on these responses and conference transcripts in writing this report. By procedural order of the Hearing Examiner, Intervenors also may submit a report on the need and alternatives for CMP's proposed transmission line by April 18. It is expected that the OPA's consultant will file a report.

B. Overview of the Region

As described more fully in Section III, CMP's proposed project involves loads and T&D systems in southern York County, in particular, the towns of York, Kittery, Ogunquit, and Eliot. The loads and T&D systems in additional towns to the west and north, e.g. the Berwicks, are also involved, but to a much lesser extent.

According to CMP's records, since 1998, electricity sales to the 4 towns (York, Kittery, Ogunquit and Eliot) have grown at an average rate of over 5.5% per year. Over the past ten years the region's peak load has been growing at a rate of about 4% per year. In contrast to much of CMP's service territory, the peak load in this region occurs in the summer. The fact that the region's highest loads and most rapid load growth occur in the summer is significant because that is also when T&D line and equipment capacity are at their lowest levels due to the effects of ambient temperature. Indeed, because the loads in the region are heat-driven, it may well be that the very highest loads coincide with the times of least T&D capacity.

The 4-town region is more densely populated and built-up than most other parts of CMPs service area. The region is also well-visited by tourists and vacationers, particularly in the summer, causing the population and population density to increase even further. Although there are some large industrial facilities in the region, such as BOC Gases, more common are small-to-medium businesses such as motels, restaurants and retailers. The region is bordered on the west by the Maine Turnpike and extends to the coast. Finally, although much of the region is coastal, it is far less peninsular than Maine's mid- and downeast coastal regions.

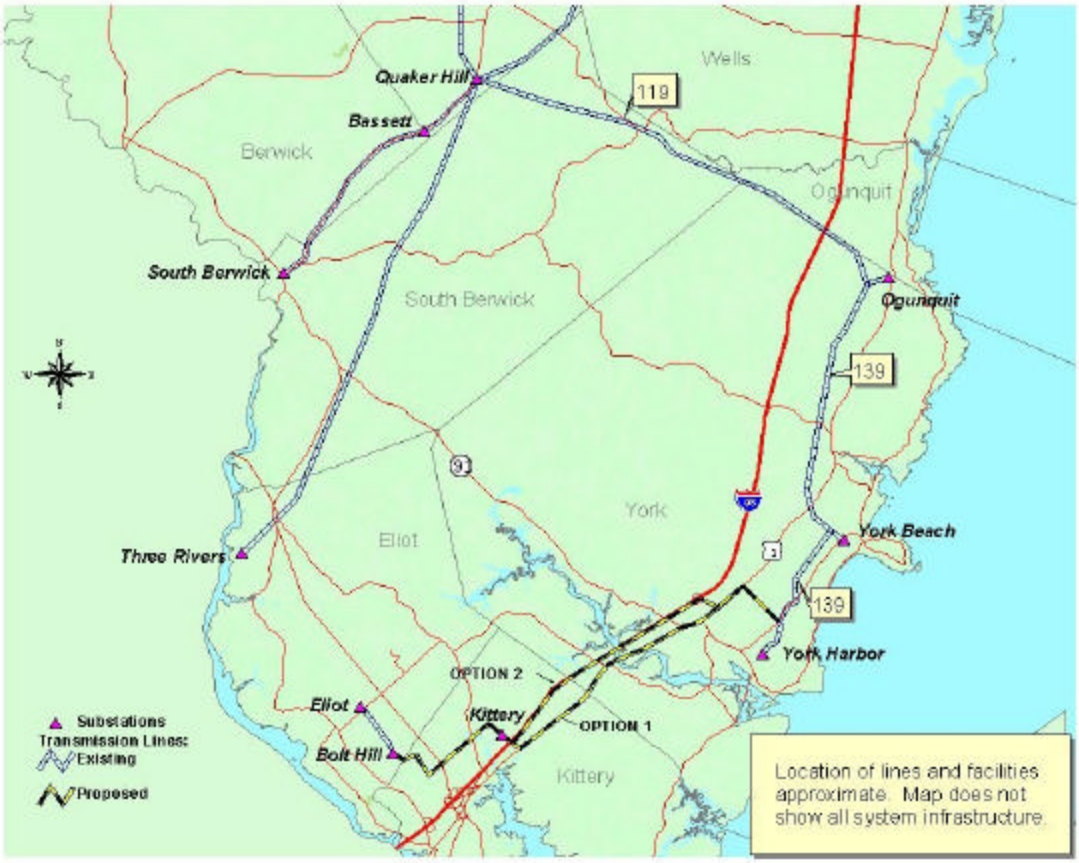
III. CMP'S PROPOSED PROJECT – SUMMARY AND NEED ASSESSMENT

A. Project Description

CMP proposed this project (designated by it as the "York Transmission Reinforcement Project") to meet two objectives: (1) to maintain service quality standards for voltage; and (2) to improve reliability by providing a second transmission path to Ogunquit, York and Kittery. CMP proposes to construct a new transmission line

(section 178) that will extend from the Bolt Hill substation in Eliot to a new substation in Kittery, and then on to connect with existing transmission line section 139 at the existing York Harbor substation. (The new line would be in one of two potential corridors, shown below as Options 1 and 2.) Presently, line section 139 is the only source of power into the York Harbor substation as well as the York Beach substation. Line section 139 originates at the Ogunquit substation, which is connected by line section 119 to CMP's 115 kV transmission system (at sections 197 and 140) at the Quaker Hill substation in North Berwick.

Options 1&2



Summer loads on the York and Ogunquit substations and existing transmission lines have been growing rapidly and are outstripping the ability of sections

119 and 139 to provide power reliably and within the parameters required by Commission rule[1] to the towns of Ogunquit and York. By adding a second transmission path into York and Ogunquit from the Bolt Hill substation, CMP's proposal would reduce the loadings and improve voltages throughout the local system. CMP's proposal would also create an electrical loop, i.e., a redundant path, that would improve the reliability of service to customers in the area and would also allow CMP to maintain the section 119 and 139 lines without having to interrupt service to customers. Finally, by connecting the loop to a substation other than Quaker Hill, customers served from these transmission line segments will also have redundant supply sources.

B. Need

The need standard we have applied has two aspects – capacity and reliability. The capacity aspect involves whether the T&D infrastructure that serves the 4-town region is sufficient to deliver electricity to customers at the required voltages. If it is not sufficient, voltage levels will drop and/or fluctuate potentially interfering with or damaging customers' electrical equipment. Ultimately, insufficient capacity would cause the T&D system to drop load, i.e., interrupt service to customers. The reliability aspect of the need standard involves whether the T&D system, by its design and operation, provides reasonably uninterrupted power to customers.

1. Capacity

As described above, the peak load in the 4-town region has been growing rapidly. Some of the existing substations and lines have already operated at or above their ratings, thus indicating that some steps are necessary even at current load

[1] Chapter 32 subsection II.D.1

levels. In addition, to evaluate the need standard into the future we examined loadings under two load growth scenarios: (1) simple trending of recent historic growth; and (2) the CMP/Duke Energy 1.6% per year growth assumption. Although we have not analyzed or developed a traditional "load forecast" in this case, based on our general knowledge of growth in CMP's service territory, the region-specific conditions of this area, and the fact that current load levels have already taxed the capacity of some portions of the system, we believe that the scenario approach is sufficient in this case to assess the need issue.

CMP provided several charts showing the recorded loadings at various points on the local T&D system for the past decade. (CMP's Response to York Selectmen's Letter, November 6, 2002, Appendix pp. 25-29.) Table 1 below provides the average annual summer peak growth rate from that data for each of the substations and line segments at issue in this proceeding.

Table 1

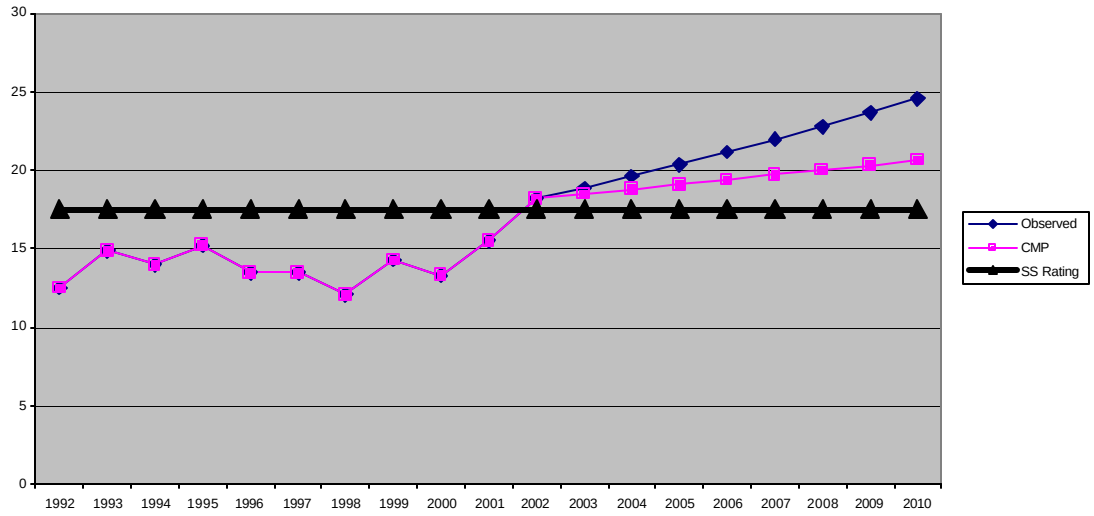
Ogunquit	York Beach	York Harbor	Bolt Hill	Section 119	Section 139
3.83%	4.04%	4.36%	3.85%	4.24%	4.57%

These average growth rates have been extended into the future for one of the two load growth scenarios (called "observed") shown in the following charts and tables. The other scenario is the 1.6% per year growth rate used in the Duke Study.

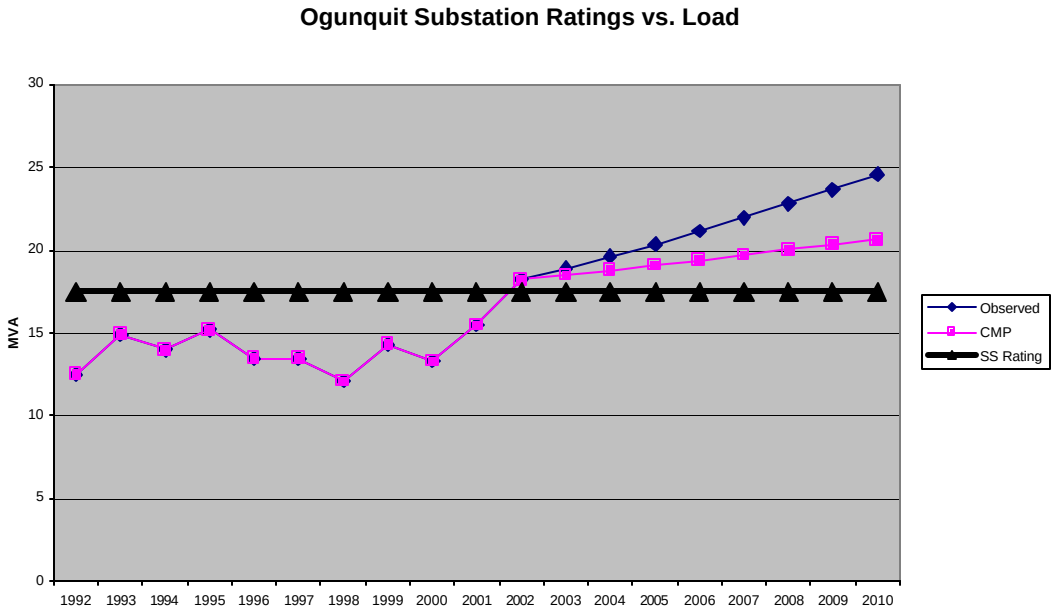
Based on actual and its projected loadings on the existing line sections and substations, the most critical need identified in the Duke Study is to reduce the loadings along section 119, which is the line between the Quaker Hill and Ogunquit

substations. As can be seen from the chart below, section 119 exceeded its ratings during the summer of 2002. The chart also shows future loadings on section 119 at the two load growth scenarios described above. The line labeled "CMP" shows the expected loadings on the line using 1.6% per year growth. The line labeled "Observed," reflects an extension of recent actual.

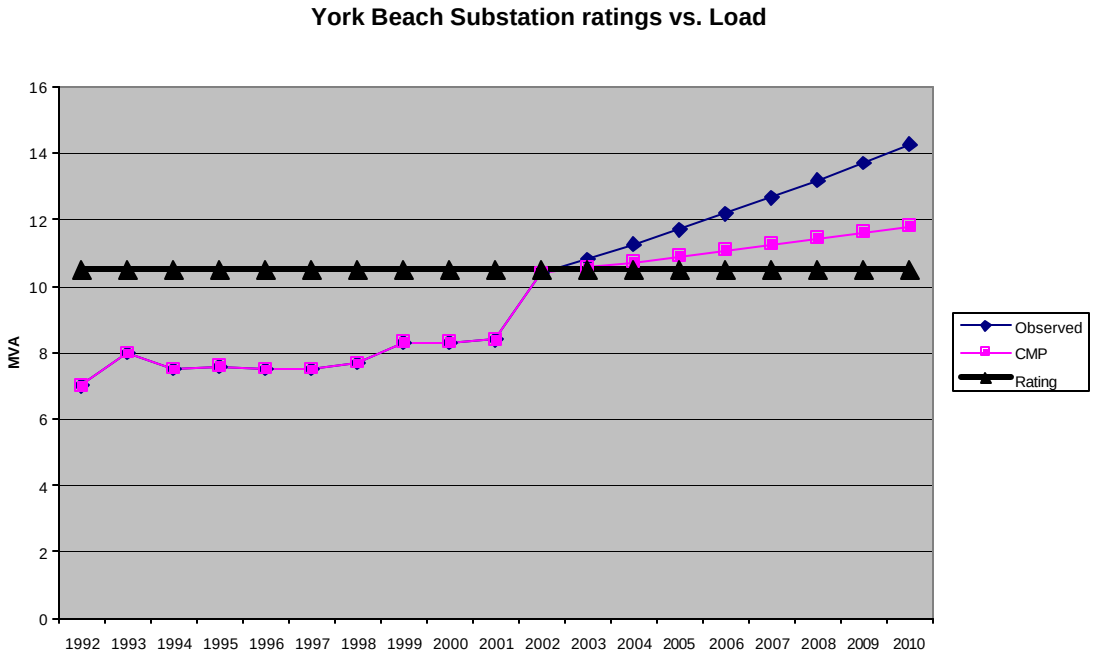
Section 119 Ratings vs. Load



In addition, the Ogunquit substation (where section 119 terminates) also exceeded its rating in the summer of 2002. The following chart displays summer peak loadings on the Ogunquit substation for the last ten years and using the two load growth scenarios described above.



The York Harbor substation and transmission line section 139 have not yet exceeded their rated levels, but, depending on the growth rate assumed, would do so within the next 2-to-7 years. The York Beach substation, however, experienced a steep increase in demand between the summers of 2001 and 2002, resulting in loadings that nearly matched the station's rating. This increase, nearly 2 MVA, represented a more than 20% growth in the peak demand on this substation in just one year. The chart below displays this, and shows expected loads on the substation under the two load growth scenarios.



In the town of Kittery, which is at the southern end of the proposed project, CMP's existing distribution system is already constrained. Currently, the Bolt Hill substation feeds three distribution circuits that serve load in Kittery. Two of these circuits have already reached or exceeded their ratings, and CMP expects that loads from a planned shopping mall and nursing home will be added to one of the already overtaxed circuits this year. The third circuit at Bolt Hill is at 86% of its rating.

In summary, much of the existing transmission system in the region has already exceeded rated levels, or is expected to do so within the next few years. Tables 2 and 3 below provide in summary form the same data shown in the graphs above. Table 2 displays the loads on each of the transmission line sections and substations assuming continued growth at the rates observed over the last decade. The bold italics indicate that the load exceeds the equipment rating.

Table 2 – Expected Load @ Trending of Observed Growth Rates

Observed Growth	Ogunquit	York Beach	York Harbor	Bolt Hill	Section 119	Section 139
2002	***18.2***	10.4	12.1	17.5	***41.5***	23.3
2003	***18.9***	***10.8***	12.6	18.2	***43.3***	24.4
2004	***19.6***	***11.3***	13.2	18.9	***45.1***	25.5
2005	***20.4***	***11.7***	***13.8***	19.6	***47.0***	***26.6***
2006	***21.2***	***12.2***	***14.3***	20.4	***49.0***	***27.9***
2007	***22.0***	***12.7***	***15.0***	***21.1***	***51.1***	***29.1***
2008	***22.8***	***13.2***	***15.6***	***21.9***	***53.2***	***30.5***
2009	***23.7***	***13.7***	***16.3***	***22.8***	***55.5***	***31.9***
2010	***24.6***	***14.3***	***17.0***	***23.7***	***57.8***	***33.3***

Table 3 below shows the expected load on each of the transmission system components using the 1.6% growth rate assumption used in the Duke Study.

Table 3 – Expected Load @ 1.6% Annual Growth

CMP Growth	Ogunquit	York Beach	York Harbor	Bolt Hill	Section 119	Section 139
2002	***18.2***	10.4	12.1	17.5	***41.5***	23.3
2003	***18.5***	***10.6***	12.3	17.8	***42.2***	23.7
2004	***18.8***	***10.7***	12.5	18.1	***42.8***	24.1
2005	***19.1***	***10.9***	12.7	18.4	***43.5***	24.4
2006	***19.4***	***11.1***	12.9	18.6	***44.2***	24.8
2007	***19.7***	***11.3***	13.1	18.9	***44.9***	25.2
2008	***20.0***	***11.4***	13.3	19.2	***45.6***	25.6
2009	***20.3***	***11.6***	13.5	19.6	***46.4***	26.0
2010	***20.7***	***11.8***	***13.7***	19.9	***47.1***	***26.5***

2. Reliability

The second aspect of the need standard involves reliability. In the current configuration, both the Kittery area and the Ogunquit – York areas are served by radial transmission lines. If there is an outage along line section 119, every customer served from the Ogunquit, York Beach, and York Harbor substations will lose service.[2]

[2] This would occur whether the outage is scheduled or unscheduled.

Such an outage could interrupt service to more than 40 MW of load, which is well above CMP's internal planning criteria that no more than 25 MW of load should be lost from a single contingency event.[3] By constructing transmission section 178, CMP proposes to connect a new Kittery substation with York Harbor, creating a looped system with redundant transmission paths and supply sources for York, Ogunquit and Kittery, and, thereby improving reliability. Creating the loop would also allow CMP to temporarily remove selected portions of the system from service for routine maintenance without major customer outages.

3. Summary

In Docket No. 93-147, the Commission found that a need for system support existed in this area and granted a Certificate of Public Convenience and Necessity for a project that was designed to address these local needs as well as to increase CMP's bulk transmission capacity. In that case, the Staff issued a report that provided qualified support for CMP's proposed project. Staff also recommended an alternative that, essentially, is the project now being pursued by CMP. CMP's Docket No. 93-147 project was cancelled, but loads in the area have continued to grow since that time. CMP has maintained adequate service to the area through a combination of interim measures, e.g., voltage regulators and capacitors. Although there may be further interim measures that could forestall the need for the project, any such measures would only be short-term, partial solutions. It is our view that a need currently exists to relieve loadings on local T&D facilities and that load in the area is unlikely to decline over the next several years. It is also our view that it is reasonable to serve this

[3] A switch failure at Quaker Hill on March 17, 2003 resulted in the loss of 20 MW of load in the same areas.

area with a looped transmission system, consistent with reliability standards for comparable regions throughout CMP's service territory.

III. OPTIONS – DESCRIPTION AND ASSESSMENT

CMP has presented various options for the York/Ogunquit area. We describe and evaluate each in this section. For convenience, we use the same naming conventions used in the Duke Energy "York County Transmission Line Alternative Analysis".

There are six basic options and variations within each option based on voltage, construction method and/or electrical configuration. The options are:

Option 1 – Bolt Hill to York Harbor, US Route 1 Corridor

Option 2 – Bolt Hill to York Harbor, Maine Turnpike Corridor

Option 3 – Quaker Hill to Ogunquit, York Beach and/or York Harbor

Option 4 – South Berwick to York Beach or York Harbor

Option 5 – Shunt Capacitors at York Harbor, York Beach and Ogunquit

Option 6 – Distributed Generation

Options 1 through 4 all involve new transmission lines to serve the area. Options 5 and 6 involve equipment cited locally at one or more of the York/Ogunquit substations. Option 7 would be a combination of new transmission and locally cited equipment.[4] In addition, all of the options would include the construction of a new substation in Kittery and new 34.5 kV transmission line from Bolt Hill to that substation.

[4] There may be other combinations beyond Option 7 that have not yet been considered or presented.

In addition to the options presented by CMP, we also considered demand side management and further short-term measures similar to those used by CMP in recent years. (See Subsection G)

The following table provides a summary of CMP's estimated costs for each option.

Option	Capacity Increase	Cost	Source
Option 1, Route 1	30%	$11,212,599	OPA-02-06
Option 2 MTA Corridor	30%	$11,747,599 $10,656,000	OPA-02-06 TDR-01-04
Option 3A – double circuit 795 and 266 ACSR	20%	$13,167,500	OPA-02-06
Option 3B – double circuit 795 ACSR only	30%	$13,552,500	OPA-02-06
Option 3C – single circuit loop	25%	$12,221,500 $20,677,000	OPA-02-06 TDR-01-04
Option 4A – South Berwick to York Harbor 34.5 kV	5%	$13,691,500	OPA-02-06
Option 4B – South Berwick to York Beach 34.5 kV	5%	$13,881,000	OPA-02-06
Option 4D – South Berwick to York Harbor 115 kV	45%	$16,331,500	OPA-02-06
Option 4D – South Berwick to York Beach 115 kV	35%	$16,961,000	OPA-02-06
Option 5 – Shunt capacitors	10%	$9,363,500	OPA-02-06
Option 6A – 15MW generator at York Harbor	30%	$27,000,000	OPA-02-07 p. 9 of 263
Option 6B – 10MW generator at York Harbor, York Beach, and Ogunquit	25%	$21,000,000 to $31,000,000[5]	OPA-02-07 p. 121 of 263
Option 7A (combined 5 and 3A)	53%	$13,750,500	OPA-02-06
Option 7B (combined 5 and 3B)	60%	$14,135,500	OPA-02-06
Option 7C (combined 5 and 3C)	> 60%	$12,804,500	OPA-02-06

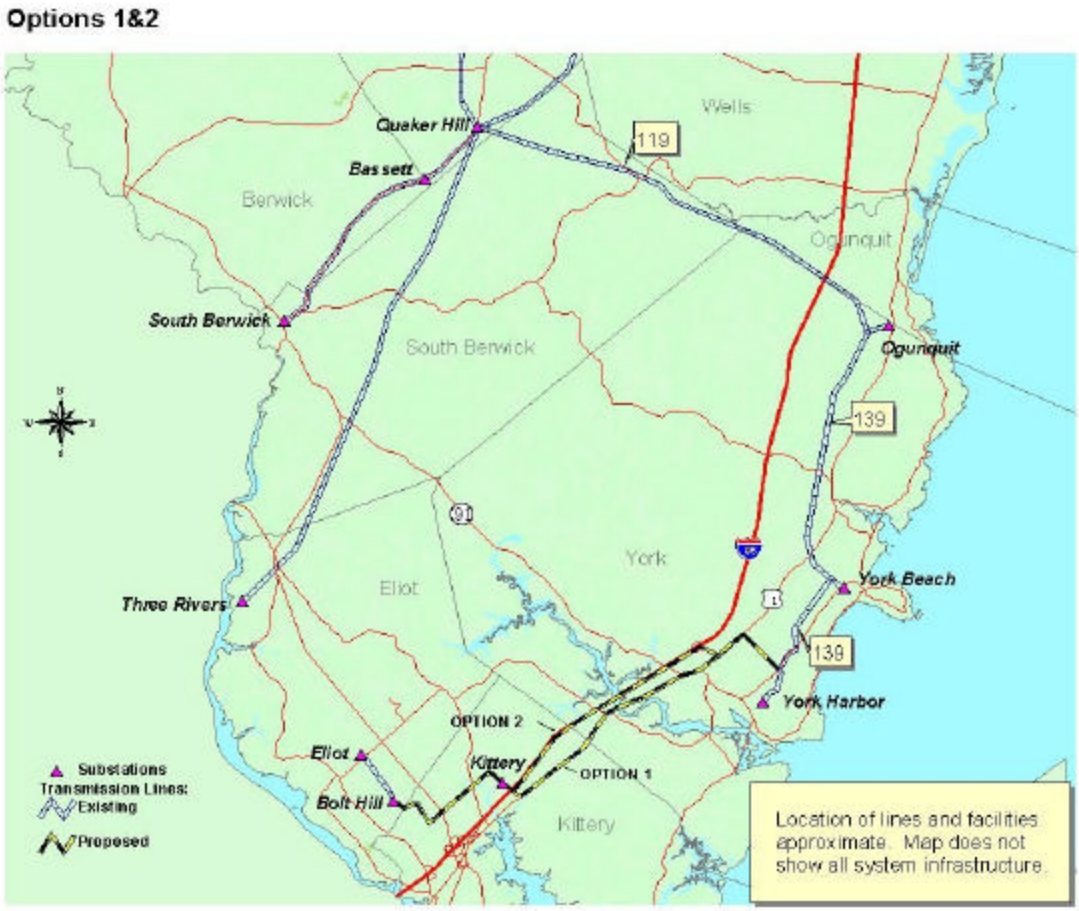
Costs for all options include the Bolt Hill to Kittery line and substation

[5] Comparable costs data for option 6B was not provided, so we included an estimated range.

A. Options 1 and 2 - Bolt Hill to York Harbor (CMP's proposed project)

1. Description

These two options have a number of variations involving routing and types of construction. Each variation includes the construction of new ten-mile 69 kV transmission line (initially operated at 34.5 kV) from the Bolt Hill substation in Eliot to the York Harbor substation and the construction of a new substation in Kittery. CMP has identified two potential routes for the new line (section 178). In both routes the new line would be in existing right-of-ways for about half of the distance. For the other half of the distance CMP has presented two different corridor options.



Option 1 would involve roadside construction of the line along US Route 1 beginning at the Haley Road intersection in Kittery to the Donica Road intersection in York. This route would require a transmission overbuild above distribution for approximately 5 miles along Route 1, and the replacement of existing 35 to 45 foot poles with taller poles (up to 50 and 60 feet). CMP has also estimated that approximately 67% of the corridor along Route 1 would require tree trimming or removal.

Under Option 2, the line would be along I-95 through portions of Kittery and York on land owned by the Maine Turnpike Authority. The new line would begin at CMP's transmission corridor in Kittery at the proposed new Kittery substation. It would then follow the MTA right-of-way along I-95 north to the York access spur that runs between the Turnpike and Route 1. From there, the line would run along the access spur to a point across Route 1, then proceed north along Route 1 roadside as a transmission overbuild above distribution to the Donica Road intersection.

Under each of the two corridor options CMP has also presented different types of construction.

Route 1:

- Option 1A: Transmission overbuild above the existing distribution line using open wire construction. This would involve the installation of bare conductors on post type insulators spaced across a 10 foot cross arm.
- Option 1B: Transmission overbuild using a Hendrix Spacer Cable System configuration. This would involve a four foot long bracket arm on the street side of the pole that would carry the insulated spacer cable in a three wire bundled arrangement supported by a messenger wire at the top of the pole.
- Option 1C: Underground construction with a duct bank system.

MTA

- Option 2A: Open wire construction on single wooden poles with horizontal line post insulators supporting the conductors on both sides of the pole.
- Option 2B: Underground construction with a Direct-Burial Cable System.

2. Assessment

As noted previously, there is a need for additional T&D capacity in the York/Ogunquit/Kittery area. Under either routing option, CMP's Bolt Hill to York Harbor project would meet this need. Both options include a new substation in Kittery that would provide for new distribution circuits and capacity for the Kittery area. Both provide additional transmission capacity into York and Ogunquit from a new source that would relieve the already loaded sections 119 and 139 and existing substations. By building the new transmission line at 69 kV standards but energizing it at 34.5 kV, there would be additional capacity for load increases well into the future.

In addition, under either routing option, CMP's Bolt Hill to York Harbor proposal would create a loop feed for the area, thereby improving reliability by providing an alternative transmission path and source of supply in the event of outages or maintenance requirements.

Thus, CMP's proposed Bolt Hill to York Harbor project using either the Option 1 or Option 2 corridor would provide the capacity needed and would increase reliability for customers in York, Ogunquit and Kittery. However, there are local impacts, and operational and safety issues related to the Route 1 corridor that make it far less preferable to the MTA corridor and possibly other options. These are discussed in the following sections.

In addition, under Options 1 and 2, CMP would use existing right-of-ways for about half of the distance. Portions of these right-of ways are not presently being used and would require extensive tree clearing and trimming to accommodate a new transmission line. In particular, there are two areas where local impacts would be noted. The first is an uncleared stretch from the Bolt Hill substation extending east to an existing line section 176 right-of-way. The second is a stretch from Route 1 beginning at the intersection of the Donica Road in York and running southeast for a distance of about one mile along the Little River to existing line section 139. These areas (and other local impacts) are discussed in the following sections.

3. Local Impacts

The York complainants, other local residents and town officials have expressed concerns about various aspects of CMP's proposed project. Concerns include degradation of real estate value, aesthetics, noise levels, safety and the environment. Specific aspects of the project noted as concerns include:

- Major tree clearing and trimming along portions of Route 1 (property value and aesthetics).
- York River crossing (aesthetics).
- Major tree clearing and trimming along the MTA corridor (noise levels).
- Proximity to the Coastal Ridge Elementary School (safety).
- Transmission line overbuild along Route 1 (safety and aesthetics).
- Multiple transmission right-of ways into and out of Bolt Hill S/S (aesthetics).
- (Environmental and scenic degradation) New right-of-ways being cleared and utilized.

Because it has been somewhat unclear throughout this case which corridor option CMP actually preferred, it may be that much of the local opposition surrounds the Route 1 option (which at this time appears *not* to be CMP's preferred route) or is a result of local residents not receiving clear and direct information about CMP's intentions. Nevertheless, CMP has now indicated that its preferred option is Option 2 – the MTA Corridor – using a single pole conductor construction. However, CMP has not yet obtained all necessary permits and approvals for the MTA route, thus we presume that Route 1 remains an option from its perspective.

4. MTA Corridor – Option 2

We consider the MTA corridor to be preferable relative to Route 1. This corridor mitigates many of the problems cited by York residents and local officials by avoiding residential areas of Route 1 and thus eliminating major tree removal and clearing in naturally wooded areas of aesthetic value to the community. The MTA corridor option would require a half-mile section of overbuild along Route 1 in York from Stonewall Kitchens to the Donica Road intersection. However, this part of Route 1 is generally commercial in nature with few trees. There also appears to be ample room for guying or set backs if necessary for road permitting or clearance requirements. This Route 1 section of the new line would be constructed on larger poles above already existing three-phase distribution line, which would result in significant changes to the guying and hardware characteristics, but in essence would be an upgrade of existing plant. There would be additional cross-arms, insulators and conductors to support the overbuild configuration but for the most part the new structures would look the same as

the existing structures and not unlike many configurations throughout the area now used for multiple distribution feeders.

Constructing the new section 178 at 69 kV standards (as CMP proposes) would be similar to construction at 34.5 kV standards. Both require the same size pole and line infrastructure configuration, with the exception of insulator class and clearances. With respect to the overbuilding of transmission over distribution on single pole plant, although the practice is not routinely used, it is within utility construction standards and has been used by CMP elsewhere in its system.

The MTA corridor option also mitigates (but does not eliminate) York River crossing issues by crossing on the west side of the Turnpike bridge as opposed to along Route 1.

The major concern expressed by local residents about the MTA corridor option is potentially increased noise levels from turnpike traffic as a result of major tree and vegetation removal. However, because discussions are still ongoing between CMP and the MTA the actual location of the line is not known and it is difficult to determine the extent of this problem. If the line is set back far enough to sufficiently reduce tree trimming requirements the noise impact may be minimal. CMP should consider this in its discussion with MTA.

There have also been safety concerns raised because of the proximity of the new line to the Coastal Ridge Elementary School in York. Our inspection of the area indicates that the new line would pass behind the school at a distance of about 250 feet. It would approach the school from a newly-cleared (but existing) right-of-way then follow a path already used for the school's three-phase

distribution feed. It does not appear to us that the new line creates safety problems for the school. Indeed, CMP appears to have taken steps to route the transmission line as far as possible from the school facilities.

5. Route 1 Corridor – Option 1

There are several concerns with respect to the Route 1 corridor option. First, the extent of the high voltage transmission over distribution overbuild in such a densely populated and traveled area raises safety and operational issues. Second, this route would require tree removal and trimming to an extent that would change the character of the area. In contrast to the half mile segment of Route 1 under the MTA option, the line's presence along Route 1 under this option would impact residential and heavily treed areas and would require significant tree removal and trimming.

As noted above, the extent of Route 1 roadside required under Option 1 would increase the potential for public exposure to high voltages, e.g., in vehicle accident situations. Because of the presence of a high voltage transmission line in such close proximity to the public, a higher standard would be needed with respect to how the line is controlled and operated compared to a line of similar voltage sited away from the public. For example, the situation could warrant safety procedures that allow switching operations to occur only after visual inspections to ensure that the line is clear and undamaged. There could also be longer repair times after outages or damage to facilities because of the multiple voltage configuration and the associated clearance requirements for equipment.

6. Mitigation

In this section we address possible steps to mitigate the local impacts of CMP's proposed project.

a. Undergrounding the Line

Placing the new transmission line underground would be significantly more costly than overhead, but would eliminate many of the tree clearing and other visual impacts of concern to the local community. Additionally, an underground configuration is more reliable than overhead because the conductors and plant are less exposed to the elements and to damage from weather or vehicles.

If the line is placed underground roadside along Route 1 it would require the installation of a conduit duct bank system. The duct bank system protects the conductor, e.g., from excavation, and would add some flexibility for future maintenance and new installations. Undergrounding the line along the Maine Turnpike would be done as a direct burial with duct bank roadside for only the half-mile stretch along Route 1 between Stonewall Kitchens and the Donica Road. Direct burial is less expensive than duct bank, but would still be much more expensive than running conductor overhead.

Because undergrounding would be so much more expensive than the overhead options, if desired for local reasons, the local communities may also agree to bear the incremental costs. These costs could be reduced by targeting undergrounding to only certain locations.

b. York River Crossing

Both Options 1 and 2 require the new section 178 transmission line to cross the York River. In 1993, when CMP sought approval to build a 115 kV transmission line next to or within the Maine Turnpike corridor in York, the York Planning Board (and perhaps other local officials) expressed concerns about the visual impact of the transmission line crossing the York River. The preferred alternative of the Planning Board was to cross the river by attaching the line to the I-95 Bridge. This alternative, however, cost $1 million more than the cost of the overhead line crossing on the west side of I-95.[6] At the time, as the visual concerns seemed to be focused on the west, upriver view, CMP suggested an overhead line crossing to the east of I-95 might satisfy local officials. An east side, overhead crossing was estimated to cost only an additional $160,000 more than the west side crossing.

The Town of York and the York Conservation Commission have intervened in this proceeding, but CMP has stated its clear preference for the MTA route only recently. CMP also states that issues remain to be resolved between it and the MTA before CMP can go forward using the Turnpike corridor. Thus, the issue of the preferred manner of crossing the York River has not yet been ripe for consideration. We presume that York officials will have the opportunity to raise its concerns and state its preferences in the necessary local permitting or zoning process, if the MTA issues are resolved and CMP goes forward with Option 2.

[6] The estimated cost of the overhead line on the west side of the river was $325,000.

In 1993, it was suggested that if the Town of York desired the bridge-attachment method of crossing the York River, that the Town should pay for the incremental cost increase. The Commission never decided the issue as the project did not go forward. *Central Maine Power Company*, Docket No. 93-147 (Order Part I, Dec. 7, 1993 and Order Part II, Dec. 14, 1993). We realize that the issue may arise again and will be prepared to address it if it does arise.[7]

[7] Since 1993, the Legislature has enacted 35-A M.R.S.A. § 2312. P.L. 1999, ch. 596, § 1. Section 2312 authorizes governing body of a municipality to require a utility to locate its facilities underground, for those facilities that are along a state highway or state aid highway in a designated historic district. However, the cost of relocation or placement is imposed on the municipality, unless the utility "has specifically agreed in writing to bear a portion of the cost." 35-A M.R.S.A. § 2312(1).

B. Option 3 – Quaker Hill to York Harbor

This option has three variations - all of which involve the construction of new transmission lines in the same right-of-ways as existing lines 119 (Quaker Hill to Ogunquit) and 139 (Ogunquit to York Harbor). Under Option 3A, CMP would add a new line that would run from Quaker Hill to Ogunquit, York Beach and York Harbor. Option 3B is the same as 3A, but CMP would also re-conductor section 139 from Ogunquit to York Harbor with a higher capacity wire. Option 3C is similar to Option 3B, except that the line would run directly between Quaker Hill and York Harbor.

Options 3A&B

Option 3C

Option 3A (new transmission line, double circuit from Quaker Hill -York Beach -York Harbor) would involve overbuilt horizontal open wire construction on cross-arms with 795 aluminum conductor, steel reinforced (ACSR) conductor from Quaker Hill to Ogunquit and 266.4 ACSR conductor from Ogunquit to York Beach and York Harbor. Option 3B would be the same as Option 3A except that the conductor size would be 795 ACSR for the entire route. Option 3C would involve a new transmission line consisting of a single circuit loop from Quaker Hill to York Harbor using a horizontal open wire construction with 795 ACSR conductor. Under Options 3A or 3B, the existing

lines (sections 119 & 139) could either remain or be removed. Under Option 3C, the existing lines would remain.

As noted above, all of these Option 3 variations would involve a new transmission line along the existing right-of-way corridors already being occupied by sections 119 and 139. Section 119 is about 8 miles of 34.5 kV line from Quaker Hill to the Ogunquit substation constructed in a single pole horizontal open wire configuration. The three phase conductors are installed on post type insulators spread along eight foot cross-arms. In 1985 CMP overhauled section 119 by replacing the pole plant and upgrading the conductor from 266.8 ACSR to 795 ACSR.

Section 139 picks up the 34.5 kV feed out of Ogunquit and extends in existing right-of-way to the York Beach substation and then to the York Harbor substation, a distance of about 12 miles. Section 139 is constructed with the same type of horizontal open wire configuration as section 119. With the exception of some individual pole replacement, section 139 plant is older than section 119. Most of the poles and the 266.8 conductor were installed in 1952.

The existing right-of-way is a 34.5 kV standard-width corridor. Based on our review, for the most part there appears to be adequate room within the right-of-way for an additional 34.5 / 69 kV transmission line running in conjunction with the existing sections 119 and 139, although there may be some exceptions where easements are needed for guying. Clearance and trimming along the right-of-way corridor would be required, although this does not appear to be extensive.

The advantage of Option 3 relative to Options 1 and 2 is that it would be much less intrusive to the area, i.e., have less of a local impact, and, thus, should

alleviate many of the local concerns. However, CMP has not as actively pursued Option 3, and it is unclear if there would be objections from other communities or abutting landowners. Clearly, though, Option 3 would avoid many of the costs and complexities of the overbuild along Route 1 (Option 1). It would also avoid crossing the York River.

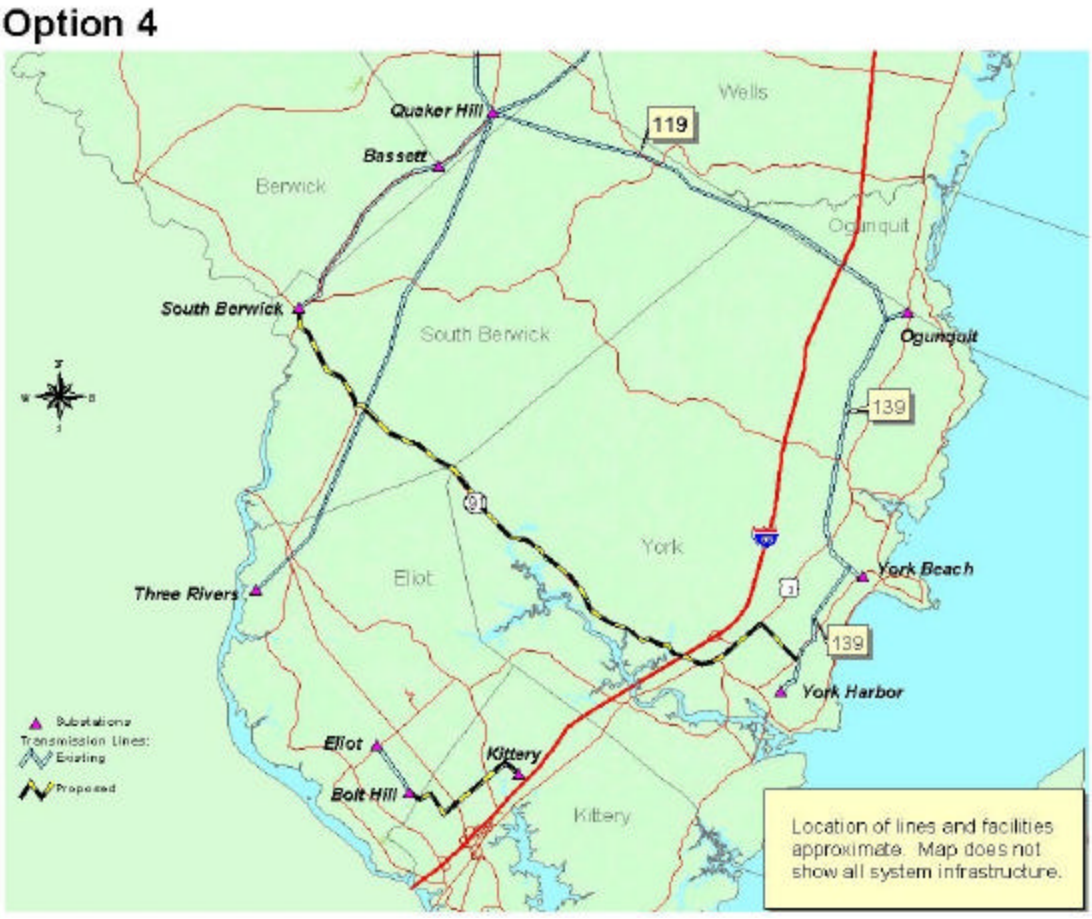
Option 3 would increase line capacity and provide moderate voltage support for the York and Ogunquit areas. Estimates by CMP and Duke Energy indicate that this option could support additional load growth of 20% to 30%. Option 3 would also increase reliability by adding another line into the area and would provide flexibility for sectionalizing and switching for maintenance or load swapping. However, the reliability improvement would be less than that provided by Options 1 and 2 because the lines into the region would all originate at the same substation (Quaker Hill). Finally, Option 3 would be less easily upgraded to 69 kV, thus less capable of accommodating future load growth than Options 1 and 2.

In our view, Option 3 may warrant further consideration, particularly if the MTA corridor cannot be used.

C. Option 4 – South Berwick to York Beach or York Harbor

Options 4A and 4B

Option 4A would involve a new 34.5 kV line from CMP's South Berwick substation to York Harbor, thus creating a loop for York Harbor, York Beach and Ogunquit. Option 4B would involve a new 34.5 kV line from South Berwick to York Beach, creating a 34.5 kV loop for York Beach and Ogunquit, but leaving York Harbor on a radial feed.



This pair of options would involve single pole construction with open conductor configuration across cross-arms. The line would be roadside along Route 91, but because a detailed design has not been developed it is difficult to determine the

extent of the local impact. However, all the Option 4 variations have the potential for impacts and local concerns similar to those surrounding the Route 1 corridor.

Options 4A and 4B would both provide a loop configuration allowing portions of the York and Ogunquit load to be fed from an additional source. This would relieve some of the loading on the line out of Quaker Hill and create a transmission loop for South Berwick, Bassett, Ogunquit, York Beach, and, in Option 4A, York Harbor. However Options 4A and 4B would provide only minimal voltage support for the area and allow for only minimal (5%) additional load growth and therefore are not preferable to other options.

Options 4A and 4B would involve no notable construction or maintenance issues, other than potential exposure to traffic or relocation for road construction or widening.

Options 4C and 4D

Options 4C and 4D are similar to the 4A and 4B pair, but would be 115 kV rather than 34.5 kV. The new line would follow the same route, i.e. roadside along Route 91. The higher voltage would require a different type of pole construction, and new substation equipment would be required at South Berwick and either York Harbor or York Beach to support the higher voltage.

Options 4A through D would provide similar reliability benefits, but 4C and 4D would provide much greater voltage support and room for growth (up to 45% additional load). Finally, our concerns about the potential local impacts of 4A and 4B would apply to 4C and 4D as well.

D. Summary of Capacity & Reliability Benefits of Options 1 - 4

CMP engaged Duke Energy to conduct load flow analyses of its proposed project and the alternatives. Our review of Duke's analyses indicates that Options 4C and 4D would create the most room for load growth (35% to 45%), providing a solution to the capacity issues well into the future. With the exception of Option 3A, the other options appear to provide similar capacity and room for growth (25%- 30%), estimated by CMP to be adequate until the years 2013-2015.

It also appears that Options 1 and 2 (Bolt Hill to York Harbor) would provide the greatest reliability improvement, although Option 3C (Quaker Hill to York Harbor, single circuit, 795 ACSR conductor) appears to have a lower loss of load from a single contingency. Additionally, we do not agree with the characterization (by Duke Energy and CMP) that Options 3 and 4 provide "low" levels of reliability. All four options would create a looped system for the area and thus would improve reliability compared to the existing radial system.

E. Option 5 – Shunt Capacitors at York Harbor, York Beach and Ogunquit Substations

Option 5 would involve the addition of 34.5 kV shunt capacitors at the Ogunquit, York Beach, and York Harbor substations. The addition of capacitors at these locations would allow more power to be transmitted across the existing transmission lines. According to the Duke Study, the capacitors would provide for satisfactory voltage relief and performance for up to 10% load growth. After that point, Duke indicates that voltages at the York Beach substation would again approach unacceptable levels. According to the Duke Study, the addition of capacitors at these locations would provide acceptable performance until 2007, assuming 2% annual load

growth in the area. Assuming load growth at recent historic rates, however, capacitors would only provide acceptable voltage relief for two years. In addition, the capacitors would provide no reliability improvement over the existing radial system.

F. Option 6 – Distributed Generation

1) 15 MW at York Harbor

2) 10 MW at York Harbor, York Beach and Ogunquit

CMP also presented various distributed generation options to relieve voltage problems in the York area - both as a temporary way to preserve service until a more permanent solution could be found and also as longer term alternative to transmission construction. Concerns over marginal system performance and the potential need to shed load first led the Company to examine the installation of small (4 MW) distributed generation units (DG) in the York area in 2000. A further review to examine the feasibility of siting small DG was conducted for CMP by Woodward and Curran consulting engineers. Duke Energy Delivery Services was contracted in 2002 to conduct a high level review of distributed generation as a more permanent solution to voltage and service problems in the York area and submitted a report in December 2002 (December Study). Two other distributed generation alternatives were examined and included as Options 6A and 6B in Duke's November 2002 Study, which is also the source of the options and analyses discussed in the above sections.

The timing and conclusions of the two Duke DG studies are confusing. The December 2002 Duke Study was "….*not intended to compare the DG option with other alternatives, or make recommendations on preferred alternatives*. It provides additional technical detail so that those comparisons can be made" (emphasis added).

In that study, Duke examined a 22 MW distributed generator located at any of the local substations. Duke is also the author of the study of CMP's proposal and alternatives (cited throughout this Staff Report as the "Duke Study"), which had been submitted to CMP just one month earlier. Any relationship between the two Duke analyses is poorly explained or non-existent. It is also unclear which of the two studies or options CMP proffers as the transmission alternative. In response to TDR-01-04, the Company provides cost data for the remotely located 22 MW distributed generation that was the subject of Duke's December Study, yet it is DG alternatives described in Duke's November Study that have been analyzed and modeled.

These questions aside, we have focused our attention on the DG Options 6A and 6B presented in the November Study. First and most importantly, our objective was to examine DG as an alternative to new transmission line construction. The distributed generation project that is the focus of Duke's December study would still require the construction of 34.5 kV transmission through the area that seems to be most sensitive to the community. Second, Options 6A and 6B have been presented in the context of an alternative analysis that evaluates whether an alternative would provide acceptable electrical performance.

Option 6A is a single 15 MW generator at the York Harbor substation. According to the Duke Study, this option would provide sufficient local capacity to maintain acceptable voltages in the area for an additional 25% growth in load. At the 1.6% assumed growth rate, Option 6A would provide acceptable voltage performance for an additional fourteen years. At the observed historic growth rate of 4.5% however, it would provide acceptable voltage performance for only about 5 more years.

The option would not provide a redundant transmission path, but would provide some reliability benefits from the locally-sited generation. In addition, electric restructuring creates issues regarding distributed generation ownership and power sales that have not been fully resolved and would have to be before proceeding with this option. Also related to industry restructuring are the institutional changes at Central Maine Power Company itself. CMP has reduced the size of its work force and re-tooled to function as a transportation company. It is unclear whether the Company has retained the expertise and knowledge to function as a generation operator. Finally, there have been no in-depth studies examining the likelihood of environmental permitting this size generator at the York Harbor substation, and given the area it seems that environmental issues and other local impacts may be difficult to overcome. These factors along with the high estimated cost do not suggest that this is a promising alternative.

Option 6B would involve three 10 MW generators – one each at the York Harbor, York Beach, and Ogunquit substations. According to the Duke Study, Option 6B would maintain acceptable voltage in the area while accommodating up to an additional 30% growth in load. At the 1.6% growth rate assumed in the CMP Southern Area studies, Option 6B would provide acceptable performance for twenty-two years. At the 4.5% growth rate, it would provide acceptable performance for only about 6 more years. For the same reasons noted for Option 6A, it is our view that option 6B does not appear to be a promising alternative to other options.

G. DSM

Another option to consider is whether the loads in the region could be sufficiently reduced with demand-side measures (DSM) so that the existing T&D infrastructure could serve the area without some or all of the proposed upgrades. For the reasons outlined below, we do not believe that DSM alone could provide enough capacity (by way of load reductions) to obviate the need for T&D upgrades in the York area. Additionally, DSM would do nothing to change the radial configuration of the system that serves the area and, thus, would provide no reliability improvements comparable to those provided by other options.

There are two basic types of DSM programs – conservation and load management. Conservation programs improve the efficiency of end uses and, when coincident with the time of the local transmission peaks, could defer the need for new transmission investment. Load management programs either "clip" peak loads or shift them to different times. (CMP's now-discontinued water heater cycling program is an example of a load management program targeted to winter peaks.) Because of the nature of the data available to us, our analysis has focused on load reductions from conservation programs. We acknowledge that load management programs could provide additional reductions through measures such as air conditioner cycling and manufacturing process interruptions. However, based on the size of the gap between the need and the potential (outlined below), it is unlikely that these programs would provide sufficient additional amounts.

1. Required reductions

To assess whether DSM would be a feasible strategy to relieve the local T&D system, we first examined potential loadings on existing transmission lines and substation equipment scenarios. Bold italics indicate the system element is loaded above its rated level.

Cumulative load increases @ historic actual rates (MW)

Observed Growth	Ogunquit	York Beach	York Harbor	Bolt Hill	Section 119	Section 139
2002	***-***	-	-	-	***-***	-
2003	***.7***	***.5***	.55	.7	***1.8***	1.1
2004	***1.4***	***.1.0***	1.1	1.4	***3.6***	2.2
2005	***2.1***	***1.5***	***1.65***	2.1	***5.4***	***3.3***
2006	***2.8***	***2.0***	***2.2***	2.8	***7.2***	***4.4***
2007	***3.5***	***2.5***	***2.75***	***3.5***	***9.0***	***5.5***
2008	***4.2***	***3.0***	***3.3***	***4.2***	***10.8***	***6.6***
2009	***4.9***	***3.5***	***3.85***	***4.9***	***12.6***	***7.7***
2010	***5.6***	***4.0***	***4.4***	***5.6***	***14.4***	***8.8***

Cumulative load increases @ 1.6 % growth per year (MW)

CMP Growth	Ogunquit	York Beach	York Harbor	Bolt Hill	Section 119	Section 139
2002	***-***	-	-	-	***-***	-
2003	***.3***	***.2***	.2	.3	***.7***	.4
2004	***.6***	***.4***	.4	.6	***1.4***	.8
2005	***.9***	***.6***	.6	.9	***2.1***	1.2
2006	***1.2***	***.8***	.8	1.2	***2.8***	1.6
2007	***1.5***	***1.0***	1.0	1.5	***3.5***	2.0
2008	***1.8***	***1.2***	1.2	1.8	***4.2***	2.4
2009	***2.1***	***1.4***	***1.4***	2.1	***4.9***	***2.8***
2010	***2.4***	***1.6***	***1.6***	2.4	***5.6***	***3.2***

For a demand side strategy to be a viable alternative, programs must reduce loads at various points within the local system by at least the amounts

indicated in bold italics. In the aggregate, DSM programs would have to reduce loads in the York/Ogunquit area by the following amounts (MWs):

	2003	2004	2005	2006	2007	2008	2009	2010
@Historic Growth Rates	1.8	3.6	5.4	7.2	9	10.8	12.6	14.4
@1.6% Growth Rate	.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6

2. Potential Reductions

Residential end uses contributing to the summer peak demands in the York area are water heating, refrigeration, and air conditioning. Commercial end uses that contribute to the summer peaks are primarily lighting and air conditioning.[8] To examine the feasibility of a demand side alternative, we estimated potential load reductions in the York Area by using information provided in a separate Commission proceeding (Docket No. 2002-162) by Optimal Energy Incorporated, a consultant engaged by the Public Advocate.[9] We used Optimal's estimates for the maximum amount of achievable kWh savings for the residential and commercial end uses that contribute to the summer peak loadings in the York Area.

DSM Program Savings Estimates (MW)

Source	2003	2004	2005	2006	2007	2008	2009	2010
Commercial Sector	.08	.12	.19	.27	.35	.39	.39	.39
Residential Sector	.002	.004	.008	.012	.016	.022	.028	.034
Total MW	.082	.124	.198	.282	.366	.412	.418	.424

[8] Data on contribution to peaks obtained from CMP response to Staff-40-01 Docket No. 92-345 dated August 4, 1993.

[9] "The Achievable Potential for Electric Efficiency Savings in Maine" October 22, 2002.

As noted earlier, under the more conservative load growth scenario (1.6% per year), DSM must immediately reduce load on line section 119 by .7 MW and provide incremental reductions in that same range every year to match load growth. Loads on the York Beach substation must be immediately reduced by .2 MW with similarly-sized incremental reductions each year thereafter. Under the higher load scenario, load reductions of about 2 MW must be achieved on section 119 right away, with additional reductions of 2 MW per year thereafter. Load reductions at other points would be needed as indicated by the amounts shown on the earlier tables. It does not appear to be feasible to achieve reductions in these ranges from demand side programs. Based on our estimates, reductions from DSM (for the entire York region) appear to be less than .1 MW per year – well below the levels needed at even the modest load forecast.

We recognize this is only a crude estimate of potential load reductions from DSM programs. It has been more than a decade since there has been a detailed look at end use consumption in the York area and the end uses contributing to the local peak may have changed. Also, the effect on the local peak of each of the end uses is taken from the Optimal study, which estimates the coincidence of various end uses with the New England system peak. To the extent the York area transmission system peaks diverge in time or nature from the regional system peak, these estimates will also diverge. In addition, we do not have data to analyze potential savings sub-region, which would be necessary to examine the effects on individual components, e.g. at the substation level. Finally, we estimated the amount of DSM available from the area using the ratio of the York area peak load relative to CMP's system summer peak

load, which is obviously a proxy rather than a region-specific analysis. Nevertheless, we believe these estimates provide an "order-of-magnitude" level indication that load reductions from DSM, even if aggressively pursued, are unlikely to obviate the need for additional T&D system capacity in the region.

H. Further short-term measures

Over the past several years, CMP has taken various steps in the York/Ogunquit area to maintain acceptable voltage levels. These include installing equipment such as voltage regulators and capacitors, adding or upgrading distribution circuits, increasing the wire size of existing transmission lines and switching loads to less heavily-loaded circuits. CMP plans additional similar steps that should be sufficient for the summer 2003 peak load and, perhaps, could accommodate local growth for a few more years.

CMP has indicated that its ability to continue to meet load growth with this strategy is limited. We do not disagree. Although it is possible that additional measures (such as voltage regulators and capacitors) could delay the need for a transmission upgrade, they are not a long-term solution for T&D system capacity to serve the area. Additionally, such measures provide no reliability improvements comparable to those provided by a looped transmission system.

IV. CONCLUSION

For the reasons set forth in this Report, it is our view that a need exists for additional transmission and distribution capacity to serve local loads in the York, Ogunquit, Kittery and Eliot areas. At this point, CMP's proposed Bolt Hill to York Harbor

project in the MTA corridor (Option 2) appears to be a reasonable alternative given the capacity and reliability it provides and its relative cost and local impacts. Option 3 may also warrant further consideration, particularly if the MTA corridor cannot be used.

We have not recommended one option at this point, because both Options 2 and 3 may be sufficient to meet the economic, safety and reliability needs of electricity customers in the area and the entire service territory. Accordingly, other factors, like those that may be raised by local municipalities, citizen groups, the Maine Turnpike Authority or the Department of Environmental Protection, may cause one option to be preferred over the other. *See Central Maine Power Company*, Docket No. U.3339. (August 11, 1987) (CMP denied certificate for transmission line until local preference for alternative route was explored.)

Dated: April 18, 2003

Respectfully Submitted,

_____
Commission Advisory Staff

Denis Bergeron
James A. Buckley
Steve Dunn
Ralph Howe
Faith Huntington